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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/035,308	01/04/2002	Chul-hong Park	249/276	2025

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EXAMINER

ROSASCO, STEPHEN D

ART UNIT PAPER NUMBER

1756

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/035,308

Applicant(s)

PARK, CHUL-HONG

Examiner

Stephen Rosasco

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Detailed Action

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liebmann et al. (5,807,649) in view of Cho et al. (6,593,038).

The claimed invention is directed to a photomask comprising a shifter, and a trim mask for blocking transmission of a particular light passing through the shifter from reaching a wafer, the trim mask including a first part having a chrome mask and a second part having a phase shift mask.

And wherein the first part corresponds to a region on which a gate pattern including a gate of a chip and a predetermined portion of a field poly extending from the gate will be placed, and the second part corresponds to a region on which a field poly pattern comprised of the field poly, but not the first pad, will be placed.

And wherein boundaries between the first and second parts at two opposite sides of the trim mask are aligned with two opposite edges of an imaginary layer, which corresponds to two opposite sides of the trim mask and is introduced when designing the trim mask.

The applicant states that if the trim mask 20 is comprised of a halftone phase shift mask, the trim mask 20 must be optically corrected in consideration of the optical proximity effect of the trim mask 20 as well as the optical proximity effect of the shifter 26. Accordingly, it is difficult to form a mask having corrected optical proximity.

Liebmann et al. teach a mask set for forming a device layer having active feature regions defined in a photosensitive layer, comprising;

a phase shifting mask including at least one opaque region corresponding to active features and a radiation transmitting phase shift area adjoining at least a portion of said first opaque region;

a trim mask including an opaque region masking said active feature region, said trim mask opaque region being surrounded by radiation transmitting regions.

And wherein said active feature region has an active feature region shape defined by active region shape side edges and said trim masking region has a trim masking region shape defined by trim masking region shape side edges, wherein said trim masking region shape completely overlaps said active feature region shape, wherein said trim masking region side edges extend a distance beyond said active region side edges of at least one overlay error between said phase shifting and trim masks.

The teachings of Liebmann et al. differ from those of the applicant in that the applicant teaches correcting the second mask pattern with respect to the first mask pattern.

Cho et al. teach a method for generating trim to be used in conjunction with phase shifters during an optical lithography process for manufacturing an integrated circuit, comprising: identifying a feature within the integrated circuit to be created by using a phase shifter to produce a region of destructive light interference on a photoresist layer;

generating the phase shifter within a first mask; wherein generating the phase shifter involves ensuring that design rules are satisfied in defining dimensions for the phase shifter; and after the phase shifter is generated, generating trim within a second mask to be used in conjunction with the first mask; wherein generating the trim involves deriving the trim from the

previously-defined dimensions of the phase shifter while ensuring that the design rules are satisfied.

And wherein the phase shifter in the first mask is used to expose a first polysilicon line in a gate region of the integrated circuit;

and wherein the trim in the second mask is used to protect the first polysilicon line from exposure during use of the second mask.

It would have been obvious to one having ordinary skill in the art to take the teachings of Liebmann et al. and combine them with the teachings of Cho et al. in order to make the claimed invention because it would be obvious to one that for the second mask to be effective with the use of phase shifting it must be designed in conjunction with the first mask.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Rosasco whose telephone number is (703) 308-4402.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661. The number for all Faxes (703) 872-9306.

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized flourish at the end.

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
10/28/03